

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)	
)	
Utilizing Rapidly Deployable Aerial)	PS Docket No. 11-15
Communications Architecture in Response to an)	
Emergency)	

To: The Commission

**RESPONSE OF xG TECHNOLOGY, INC.
TO NOTICE OF INQUIRY**

xG Technology, Inc. ("xG" or "the Company"), by its representatives, hereby submits its response to the Commission's *Notice of Inquiry* (NOI) in this proceeding, which examines the role of deployable aerial communications architecture (DACA) in facilitating emergency response by rapidly restoring communications capabilities in the immediate aftermath of a catastrophic event.

STATEMENT OF INTEREST

xG welcomes this opportunity to describe its recently developed technologies and how it is well positioned to assist in providing emergency communications following a local or national disaster. The Company is a leading developer of innovative communications technologies for wireless networks. Its extensive patented intellectual property portfolio covers a broad range of applications including cognitive radio networks. The Company has commercialized its technologies to create xMax, the world's first carrier-class cognitive radio network using licensed or unlicensed spectrum. During the past two years, the Company has successfully deployed and operated cognitive cellular mobile radio test networks in Fort Lauderdale, Florida and rural Arkansas, using the unlicensed 900 MHz band under Part 15 of the Commission's Rules. More recently, the U.S. Army awarded xG a contract to conduct laboratory and field tests of its xMax cognitive cellular network for potential use by military forces. Under the terms of

the contract, the Company delivered xMax equipment to the Fort Monmouth, New Jersey laboratory facility for the Army's Communications-Electronics Research, Development, and Engineering Center (CERDEC). In addition, xG installed and provided training for the Army to operate a multisite xMax system over a large part of the Army's Fort Bliss Desert Training areas. xG has commercialized its technology through a range of spectrum-agnostic, cognitive radio solutions that enable commercial service providers and public safety entities to deliver a wide range of fixed and mobile wireless services using licensed and/or unlicensed spectrum.¹

A graphic description of the network is shown in the attachment. The RF equipment is shown in the graphic as the xAP (base station) and xMod (subscriber or other end-user units). As indicated, the xMod is a bridge between Wi-Fi, USB and Ethernet enabled devices and the xMax network. The xMod unit contains a Wi-Fi access point (FCC certified) that currently operates in the 2.4 GHz band. It also contains an xMax subscriber radio that currently operates in the unlicensed 900 MHz band. The xMax Mobile Switching Center (xMSC) is the backbone network element in the xMax regional network. The xMSC controls the delivery of voice and data services and manages all elements in the xMax network (xAPs and xMod personal hotspots).²

Devices that have Wi-Fi capability (like computers, laptops, smart phones and tablets) attach to the Wi-Fi access point in the xMod. Devices can also be tethered to the xMod directly via USB and Ethernet cables. The versatility of the network and the fact that it is capable of operating in either licensed or unlicensed spectrum are factors of considerable value in structuring a system to be capable of providing emergency communications.

¹ Further information about the Company can be found at www.xgtechnology.com.

² xMax, xAP, xMod and xMSC are all registered trademarks of xG Technology, Inc. Wi-Fi is a registered trademark of the Wi-Fi Alliance.

INTRODUCTION

The quantum leap in chip technology and the ability created by xG's xMax carrier class cognitive radio network solution are factors that can play a useful role for not only DACA but also any form of wireless communications for normal, unusual, or emergency situations. Using the xMax system will provide the reins of command in any situation, in any environment, using any present telecommunications or computer device as long as it has the ability to connect to the xMod using secure Wi-Fi, USB, or Ethernet. These include any smart phone, laptop or desktop computer, tablet, or any other device that has a Wi-Fi, USB, or Ethernet connection. The xMax system permits voice calling to and from landline phones, mobile-to-mobile calling, text messaging, web browsing and receiving/sending data. The raw data rate is approximately six (6) Mbps. One xMod can support up to five (5) wireless devices at the same time since it also functions as a hub. The xMax system can be set up and made operational within minutes of arrival at an emergency situation.

While the xMax technology is capable of operating on any frequency, the current design limits operation from approximately 300 MHz to 3 GHz. Antenna selection dictates the actual operating frequencies which can be controlled by software. A web-accessible controller can create a set of rules that either permit or exclude any portion of the network's frequency range, thereby allowing instant changes to the allowable frequency bands as conditions change. The proprietary cognitive radio technology incorporates orthogonal frequency division multiplexing (OFDM) and two-by-four multiple input-multiple output (MIMO) features. The technology is used in the xMod as well as the xAP (the xG base station). This permits interference-free operation on any of the selected frequency ranges. A key feature of the cognitive aspect of the system is the ability to detect and avoid potentially interfering radio signals seamlessly. For

example, if an xMax network is temporarily using commercial cellular radio channels because the service provider's network has failed in catastrophic circumstances, the xMax system will detect those cellular signals when they come back online. Having detected them, xMax will be capable of migrating to other portions of the RF spectrum according to the rules set up in the web-accessible controller, leaving the cellular system to continue operating without interference. xMax networks self organize, so no frequency planning is necessary.

Components of the xMax system, including the xAP and xMod, are small enough to fit and operate in the present Remotely Piloted Vehicles (RPVs) in use today by the U.S. Army. Given this size advantage, it will fit in larger aircraft including helicopters, fixed wing and stationary aerostats. It also fits in vehicles such as Humvees, trucks, SUVs, cars, ships, boats and other vehicles. Since every component of the network utilizes the xMax cognitive radio technology, no frequency planning or use pattern is necessary prior to system deployment due to its ability to create its own RF plan in real time. The more xAPs, the more users that can be accommodated; so growth is limited only by the total number of channels available for operation.

It should be noted that in the tests of the xMax system recently conducted by the U.S. Army, the Army tried to, but could not jam the xMax devices. This is a factor that must be considered in any national security situation and is another benefit of the cognitive radio system developed by xG. The xMax system with inference mitigation (avoidance) and self-organizing capability make this system smaller, faster and easier to put into service.

RESPONSE TO NOI

Having described the xMax system, its capabilities and its advantages in emergency

circumstances, xG will attempt to provide useful information to the Commission in response to the specific areas of inquiry.

A. DACA Technologies

As described herein, the xMax system can be deployed on any of the DACA platforms suggested in the NOI. The system can also be used on ships for coverage on or across small or large bodies of water. Since the smallest xAP weighs less than 20 pounds, any aerial vehicle could have constant and direct communications with personnel and equipment on the ground. The ground-based xMax solutions, as stated, could be vehicle mounted or packaged for deployment anywhere in the country. The system would be ready for operation as soon as power is supplied and a connection is made to the xMSC. As previously described, no frequency coordination needs to be done.

B. Scope of DACA Usage and Coordination of Operations

As the xMax system is able to use any device with a Wi-Fi, USB or Ethernet connection, the scope is restricted only by the size required to complete the mission. For example on 9/11, the U.S. Air Force flew an Urban Search and Rescue Team of 90 plus responders from the Los Angeles City Fire Department to New York City. Except for possible cell phones, they had no way to communicate with anyone in New York City, once there. With the xMax system deployed, they could have simply allowed their existing smart phones/devices to connect to the xMax network, which would have been easily and automatically accomplished when the devices came within range of the xMax network.

As far as the National Airspace system is concerned, all aerial platforms are required to meet the rules of the Federal Aviation Administration (FAA); and the deployed aerial xMax

systems would operate within these FAA rules.

AT&T takes the position that DACA technologies should only be used as a last resort to avoid impeding restoration efforts and the potential for harmful interference. However, these claims are unjustified because they appear to be based on the use of conventional technology. With the xMax cognitive radio system, interference with existing licensed commercial and public safety systems is not a valid concern. All participants that had commercial cellular service from AT&T would also be able to connect to an xMod on the network. They would still be able to communicate on the AT&T network once it is returned to service. The xMax network can be used in place of or in addition to existing cellular services since it does not alter the cellular-capable device in any way. Customers of AT&T, or any carrier for that matter, would then be able to resume their normal communications or they could still be linked to the xMax system, as circumstances dictate.

States that have emergency operations centers or their equivalent should be in charge and direct emergency operations including coordination of activities within their states. For national and interstate emergencies, Homeland Security should be the coordinator. The advantage to having all emergency personnel on one system using existing commercial off-the-shelf equipment (COTS) on the xMax system is self apparent.

Generally, for fast and easy response, the frequencies that should be used in an emergency when existing networks are down or overloaded should be preplanned and preprogrammed into any emergency system that will be used. We would suggest, in addition to the assigned emergency frequencies, that unlicensed frequencies should also be used since this approach offers additional bandwidth and will not interfere with legacy systems.

C. System Performance

1. Coverage

Depending on the height of the deployed xAP antenna, the range from a single xAP could be anywhere from a half-mile radius at 40 feet, up to and beyond a 12-mile radius depending on the topography of the area in which deployed. This assumes 4 watts EIRP, as prescribed by the FCC's Part 15 rules. Since satellite connections should be available on any emergency equipment setup, the issues associated with damaged or destroyed preexisting infrastructure can be overcome and connection to the Internet or national telephone network restored.

2. Frequency Planning and Minimizing the Potential for Harmful Interference

There is no potential for harmful interference with the xMax system operating in the range of 300 MHz to 3 GHz, when the band map is set up properly. If unlicensed frequencies were utilized and a cognitive radio system like xMax were to be deployed, no frequency planning or interference issues would arise. We would suggest that in these kinds of emergency situations, the FCC's Part 15 rules should be waived and maximum power limits (for example) should be increased to levels that would allow the greatest possible range of the xMax equipment used in the emergency to be realized.

DACA systems using xMax can operate at any reasonable altitude as determined by the FAA or other air traffic controlling facility. Tethered aerostats can be used with the xMax system; however, they are probably not going to be the first assets deployed. When and if they are deployed, the coverage pattern and volume of communications will determine the altitude needed. For example, if a large magnitude earthquake were to hit southern California with massive widespread damage, no one system location would be able to provide sufficient

coverage. Multiple locations would be required based on area and terrain. xMax could be successfully deployed across multiple sites and multiple ground and aerial platforms, again without electrical interference being a factor. Ships could cover the coast, DACA further inland, ground units on the mountain tops and fill-ins as required. However, the xMax system would accommodate all responders. Mobile xMax systems on trailers with VSAT backhaul have been successfully demonstrated. These can be deployed and turned up on very short notice. Since VSAT links work with the xMax system, the system can be connected anywhere the command authority dictates as long as there is a line-of-sight path to the VSAT or terrestrial system.

3. Interoperability

As shown herein, use of the xMax system preserves interoperability for all emergency responders. As also shown, xMax can interoperate with existing communications network services both during the disaster and in the aftermath when these services are restored to normal operation. Since the xMax system works like any conventional system and utilizes COTS devices, an end user (emergency responder) could use the xMax system or any other commercially operating system on which his or her device is registered as a regular user or as a roamer.

C. Prioritization of Service and Access

xG believes that prioritization of service and access should be the sole responsibility of local and federal emergency management command authorities. This is not an area in which the FCC should be actively involved.

D. International Considerations

The Commission is justifiably concerned with potential interference to Canada and

Mexico. However, it should be noted that the existing frequency allocation plan is the same across all of the Americas, except for French Guiana; so when using these frequencies with a cognitive radio network like xMax, international frequency interference and coordination issues with Mexico and Canada should be fully mitigated.

CONCLUSION

The xMax cognitive radio system is a breakthrough technological advancement in the radio art that has been proven to work as designed and developed by xG in Fort Lauderdale, Florida. Test systems have been successfully deployed in both urban and rural settings, as well as in tests with the U.S. Army. The xMax system has been proven to have a fast and easy setup when deployed. It eliminates frequency planning issues that arise in other traditional (non-cognitive) wireless networks that cause delays and consume valuable manpower in the early hours of a response. It is the only carrier-class wireless network capable of immediately using the unlicensed bands along with whatever licensed bands have been programmed into the system. Nothing else gives this flexibility to use any available frequencies to get the first responders communicating and coordinating. Because of its interference avoidance capabilities and the fact that it can operate on such a wide band of frequencies (including unlicensed spectrum), it is uniquely suited for use in providing prompt and interoperable communications in the event of emergencies and national disasters. Another of its most important and unique advantages is that it is the only system to our knowledge that can use COTS devices from any cellular network that have either Wi-Fi, USB, or Ethernet connections, and still allow these devices to work on their original networks when either returned to service or when otherwise required. Experience has shown that conventional technologies typically require extensive frequency planning, allow only

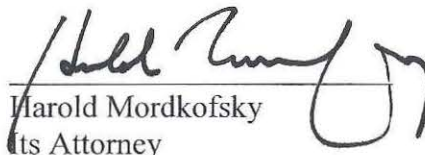
the use of devices specifically designed to be used with the particular system and do nothing to mitigate electrical interference issues. In short, they are not flexible or adaptable enough as the circumstances change to adequately perform in immediate disaster situations.

xMax is an all IP and VoIP system that has the advantages of light weight, portability, low power consumption, frequency versatility and interference avoidance. It can also be used in conventional telecommunications systems to maximize frequency utilization. xG believes that xMax, whether used in a DACA system or deployed terrestrially, holds great promise for public safety and homeland security. xG is prepared to provide the Commission with further information upon request.

Respectfully submitted,

xG TECHNOLOGY, INC.

By:



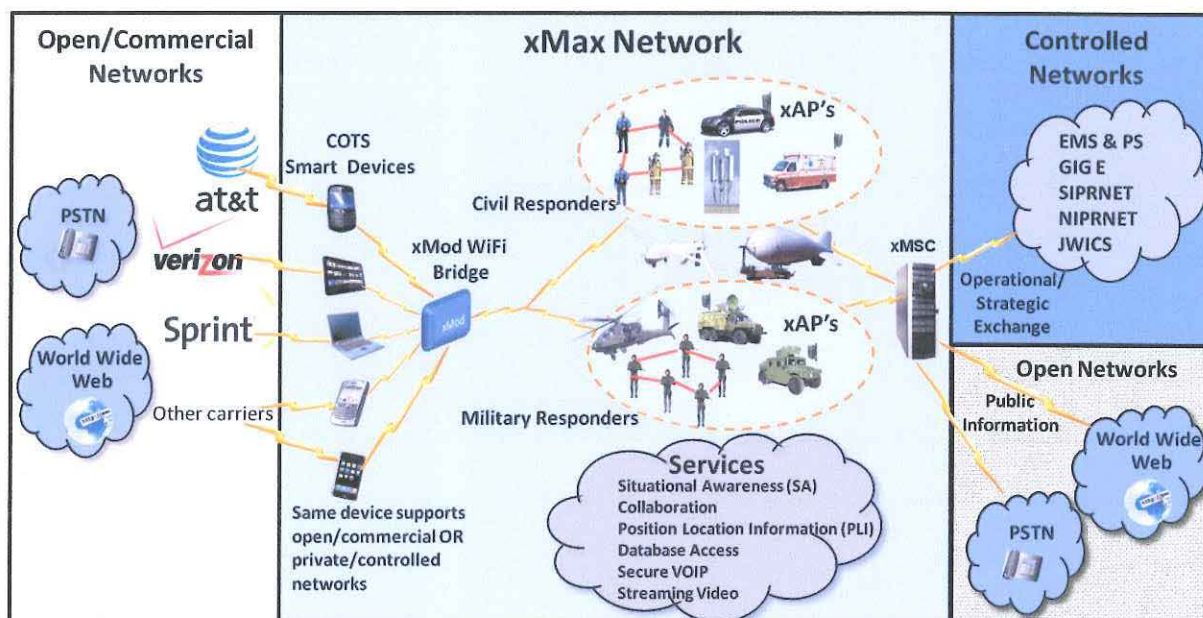
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xMax: Optimized for use in National Security & Emergency Preparedness Communications



When mission-assured communications and the imperative for resilience and COOP are paramount as in military and 1st responder communities, an xMax cognitive network provides a level of integration and interoperability heretofore unachievable. Created on an 'expeditionary' design basis, the xMax network delivers a rapidly deployable, scalable and operationally flexible network that dynamically adapts to the fast-breaking and rapidly changing circumstances typically encountered by security forces. Most importantly, xMax provides an all-IP, digital link to the lowest tactical level employing handheld COTS Smart devices eliminating the 'digital divide' in security force operations. The employment of COTS devices also means security forces can leverage commercial wireless infrastructure when advantageous without becoming operationally, fiscally, or geographically constrained by it. Alternatively when mission requirements dictate, the network can be operated as a secured 'closed loop' allowing only mission essential personnel access. As significantly, the self-organizing xMax cognitive network operates equally well in dedicated/licensed and unlicensed spectrum providing additional spectrum capacity for security force use. The cognitive software-defined radio (C-SDR) framework includes frequency agility, interference-mitigation/avoidance algorithms, and mature COTS/IP building blocks (such as session initiation protocol (SIP) and real-time transport protocol (RTP)). The spectrum agnostic and interference mitigation attributes of xMax render a waveform with exceptional resistance and extremely low probability of jamming (LPJ).

xMax closes a critical capability gap providing security forces with an affordable, independent, enterprise handheld broadband service that can be dynamically adapted for administrative and tactical use in homeland or in the operational theaters beyond. It provides all of the above while retaining an ability to exploit commercial wireless networks without dependence on them.